# RATIONALE, SUMMARY AND CONCLUSIONS REPORT
# HUMAN HEALTH RISK ASSESSMENT
## NORTH OF COKE OVENS (NOCO) AREA - SYDNEY, NS

**EXECUTIVE SUMMARY**
**FINAL**

NOVEMBER 2001

*JDAC Environment*
A Joint Venture of:

Jacques Whitford

DILLON CONSULTING

ADI GROUP

CBCL LIMITED

# EXECUTIVE SUMMARY
# HUMAN HEALTH RISK ASSESSMENT
# RATIONALE, SUMMARY AND CONCLUSIONS REPORT
# NORTH OF COKE OVENS (NOCO) AREA
# SYDNEY, NOVA SCOTIA

**This Executive Summary contains information that is proprietary to JDAC Environment Limited. This information is made available to you solely for the purpose of this project. No information contained herein shall be duplicated, used or disclosed in whole or in part. There shall be no disclosure of any information to any third party without the prior written consent of JDAC .**

# EXECUTIVE SUMMARY
# REPORT

## TO

## PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

## ON

# HUMAN HEALTH RISK ASSESSMENT
# RATIONALE, SUMMARY AND CONCLUSIONS REPORT
# NORTH OF COKE OVENS SITE
# SYDNEY, NOVA SCOTIA

**JDAC ENVIRONMENT LIMITED**
**c/o 3 SPECTACLE LAKE DRIVE**
**DARTMOUTH, NS B3B 1W8**
**TEL:(902)468-7777**
**FAX:(902)468-9009**

**NOVEMBER 26, 2001**

**This Executive Summary contains information that is proprietary to JDAC Environment Limited. This information is made available to you solely for the purpose of this project. No information contained herein shall be duplicated, used or disclosed in whole or in part. There shall be no disclosure of any information to any third party without the prior written consent of JDAC .**

# EXECUTIVE SUMMARY

**Overview and Concept**

The risk assessment for the area North of the Coke Ovens (NOCO) in Sydney, Nova Scotia has been prepared by JDAC Environment (JDAC) at the request of Public Works and Government Services Canada (PWGSC). The purpose of the risk assessment is to evaluate the current and future potential health risks associated with the substances currently in the individual and NOCO community environments. One component of this is to compare them to risks in other similar urban communities. For comparison purposes, select areas in urban Sydney outside the NOCO area were also studied. The total number of sites is 124. Of these, 102 are in the NOCO area including residential sites, vacant lots, common areas, industrial sites, and an undeveloped area. In addition to these, 22 residential and common areas located in the Sydney urban area outside NOCO were assessed as the NOCO sites were. In some cases, where current and future land use may differ, more than one risk assessment has been conducted for each property. Further, the entire NOCO area was assessed as one site for a community risk assessment, pooling the compilation of relevant data into one data set and assessing it for potential residential exposure.

The specific objectives of the study are as follows:

- to quantitatively evaluate the potential for adverse health effects at each site by estimating the magnitude of potential non-cancer hazard and the incremental increase in potential cancer risk that the identified substances at each property could pose to a receptor[1] over a lifetime; and

- to provide a risk management framework to PWGSC so that appropriate mitigation strategies can be developed where potentially unacceptable hazards or risks are identified.

This risk assessment includes an assessment of the presence of potentially hazardous substances, an assessment of potential effects on current residences, and an assessment of the potential for health effects among people currently exposed. Although the current risk assessment followed standard and customary procedures, it used significantly more analytical information than typical risk assessments. It also introduced the use of a risk assessment questionnaire to ensure that each of the individual risk assessments were truly property-specific. Additional noteworthy considerations include:

- *The extent of exposure that can be addressed in a site-specific risk assessment*: The risk assessment addresses exposure to substances in soil and groundwater or surface water at the property. Consideration is also given to the substances received through food or similar sources, but not to substances present as a result of smoking, alcohol, nor does it consider health issues associated with socioeconomic conditions.

- *The time frame for exposure:* The risk assessment time frame is based on a 70-year lifetime for a receptor that is born on the property and spends their entire lifetime living there. The time frame begins with the time the environmental samples are collected and proceeds forward for the 70-year period.

Even though significantly more property-specific information as available for these risk assessments, than is typical, the fundamental structure of the risk assessment process is inappropriate for the evaluation of retrospective health issues.

*1 A receptor is defined as any person who could come into contact with a substance of concern. For the NOCO study, receptors are considered to be people who spend an entire lifetime on a single property.*

- *Retrospective Health Issues:* The risk assessment does not include exposures associated with the occupational setting, as well as exposures that might have occurred as a result of historical industrial activities. The exception to this would be the residual products of airborne deposition or infilling, since these would be present in property soils and would be identified in the sampling results with respect to substance and concentration, but not source.

In addition to the objectives and additional considerations of the risk assessment, it is important to note many of the central technical and philosophical components of the risk assessment. These include:

- *Site-Specificity:* The site-specific approaches used for this project allow assessments to be personalized to the point that detailed accurate information such as concentrations of substances and frequencies and duration of exposure may be incorporated into the process.

- *Conservatism:* The concept of conservatism is one of the most important for the conceptual framework of health risk assessment. The exact value for each of the factors used in standard risk assessment are difficult to discern. Therefore, the process carries significant uncertainty. In the face of the uncertainty, it is acceptable to overestimate the predicted risks. It is never acceptable to underestimate the risks. As a result, the risk assessment is based on a series of compounded uncertainties that ensure that the potential risks are not underestimated.

- *Consideration of Background:* Background analysis is a critical component of a risk assessment conducted in an urban residential setting. The urban setting contains generally higher background concentrations of substances than the rural or natural setting. Since background concentrations of some substances may pose theoretically unacceptable risk themselves, it is important to identify the concentrations of these substances that are present. In this assessment, concentrations of substances detected at the site are compared to urban background concentrations in an unaffected reference area, North Sydney. If the concentrations at the site are lower or the same as urban background risks, then the potential risks from exposure at the site are considered acceptable.

- *Innovative Risk Management:* Risk management approaches may be employed in a variety of ways, but the most effective ensure that unacceptable risks are mitigated. The mission of these efforts is to eliminate unacceptable exposures, regardless of how they are eliminated. In this assessment, remediation target concentrations (cleanup levels) are not calculated. Cases of unacceptable risk are resolved by removing the highest concentration of the unacceptable substance. A rerun of the risk assessment then ensures that potential risks are now acceptable, or that the next highest sample must be removed, with a subsequent retest of the residual data. Using this approach, acceptable levels of potential risk are achieved without the broad application of a generic remediation target.

**Activities Employed for Each Site**

Each of the risk assessments is designed to be site-specific. The approach for each site is as follows. Initially, the site is visited by a risk assessment team member. The team member administers a questionnaire to the property owner to collect information that is required for a site-specific risk assessment. Samples are collected from all relevant environmental media as well as discrete locations identified through the use of the questionnaire. The questionnaire becomes a component of the package of information that is used for the site-specific risk assessment.

The results of the risk assessment are compiled into a package of information that is intended for each property owner. The package includes a letter describing the approach and the results for the site, a site map, a general layman's description of the risk assessment process, a summary of the raw data, a table presenting the Exposure Point Concentrations, a risk assessment checklist and a graphical description of the results. In addition, risk management recommendations are included on a site by site basis.

**Technical Approach**

The approach for the functional aspect of the risk assessment is standard and customary. The technical risk assessment consists of four main steps, these include: Hazard Assessment, Toxicity Assessment, Exposure Assessment, and Risk Characterization. These steps are discussed in brief detail, as follows:

- The Hazard Identification stage involved the identification of substances at each site that warrant additional attention. The substances tested included BTEX/TPH, PAHs, and metals. These substances were tested for in the soil, groundwater, in any basement seeps, sumps, basement dirt floors or any other locations that these substances were expected to be present (e.g. coal ash piles).

- The Toxicity Assessment involves the identification of the toxic endpoints (biological effects) for each of the substances. Toxicologists defined the toxic endpoints based on scientifically reviewed, published toxicity values, from Canadian and American sources. These toxic endpoints for each chemical were either carcinogenic or non-carcinogenic.

- The Exposure Assessment involves the identification of the receptors of concern (i.e. resident and recreating adults and children), and the evaluation of the likelihood or degree to which these receptors might be exposed to the detected substances. All potential 'exposure pathways' (the way a person is exposed to the substances, such as through touching, ingestion, inhalation, etc.) were individually examined to determine which were the most significant on each property. Both current and potential future land use conditions for each site are assessed. The majority of the sites are residential, and future residential land use is assumed. For common areas and vacant lots, current recreational and future residential land use is assessed. The industrial site and the undeveloped lot were assumed to remain as they are currently. The calculations were carried out using standard and customary exposure, fate and transport models taken from peer-reviewed literature.

- The Risk Characterization stage involved a quantitative assessment of the potential health risks of each substance to each receptor, based on the predicted amount of exposure. The risk characterization employs standard dose calculations that result in the identification of potential non-cancer hazards and theoretical incremental increased lifetime cancer risks. The effects associated with multiple constituents are summed if they effect the same target tissue. The Uncertainty Assessment involved a qualitative assessment of the uncertainties and the appropriateness of the assumptions in the risk assessment. The predicted health risks are compared to acceptable risk benchmarks (as defined by government policy) and potential risks from background concentrations (based on the results of other studies in the area). The comparison to background for substances that pose potential unacceptable health risks is critical to the risk management decision for the site.

The risk assessment methodology noted above is applied to each site. The process applied is described in more detail in the Main Report.

**Conclusions**

The results of the risk assessment may be summarized as follows: In the NOCO area, 60 sites appear to warrant action, while 42 sites do not. The common areas and undeveloped area do not warrant further action under current land use. In the Sydney urban area outside NOCO, 11 sites require action while 11 do not. None of the common area sites warrant further action. The results of the risk assessments are summarized in Table 1 through 4.

A number of conclusions and recommendations may be drawn from the observations made on the NOCO data and risk assessment. These include:

1. Based on the results of the individual site-specific risk assessments in NOCO, remedial action is recommended at certain specific properties where the calculated potential non-cancer hazard and potential increased incremental lifetime cancer risk exceed the benchmark for action. Action was recommended for substances where the Hazard Index or Risk Quotient was above 1.0 and above the hazards and potential risks for background. For non-carcinogens, the contribution from the property to the Hazard Index must also be greater than 0.2.

2. Most of the cases where remedial action was recommended in the NOCO area are based on potential unacceptable risks associated with arsenic, although some of the cases are associated with lead, and a few are associated with the potential effects of PAH, TPH and other substances.

3. The results observed for the individual sites in the NOCO area are consistent with the community risk assessment. Only arsenic and lead exceed the established benchmarks for action at the community level. For the child, the potential non-cancer hazard index associated with lead exceeds the non-cancer hazard index established for the urban reference area, but only slightly (10%) exceeds the regulatory benchmark of 1.0. For the residential receptor present in the community for a lifetime, the potential cancer risk associated with arsenic in the NOCO community is higher than that predicted for the urban reference area. However, the potential risk from exposure to site soils is much less than the potential risk from other sources such as food and the municipal water supply. When all the exposures are considered together, the increase in potential risk from exposure to arsenic in the NOCO community is 5% higher than the potential risk from exposure to arsenic in the urban reference area (North Sydney).

4. The quantitative assessment of health risks from garden produce and blueberries was not possible due to limitations in predictive soil-plant translocation factors in the scientific literature and inconsistent regulatory precedent.

5. The risk assessment for the selected urban sites outside the NOCO area indicate that a number of properties there also exceeded the established benchmark for exposure to arsenic, with a few for lead, one or more exceeding benchmarks for other substances such as TPH and PAH.

6. Sites for which short-term criteria were exceeded should be remediated during other remedial activities, regardless of the current land use.

7. The remedial actions recommended for each property will reduce the risk on those properties and in the community as a whole below the benchmark for action.

**Risk Management**

Risk management recommendations for the sites posing potential unacceptable risk are based on the need to eliminate exposure to unacceptable concentrations of the substance of interest. Depending on the results of the risk assessment, the elimination of exposure may be achieved through any of the following techniques:

- removal and replacement of soil;
- treatment of soil;
- covering of soil;
- cleaning or repair of areas inside the home, such as seeps or sumps and repairs to prevent further entry of substances into the house;

The individual risk assessments include site-specific recommendations for risk management, as warranted.

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SLFS-001 | Lifetime Resident | Dermal Contact/Ingestion/Inhalation | Basement Dirt | TPH | 10050 | 2.7 | | | X | | X |
| | Toddler | Dermal Contact/Ingestion/Inhalation | Basement Dirt | TPH | 10050 | 8.5 | | | | | |
| | | Dermal Contact/Ingestion | Basement Dirt | Lead | 594 | 1.5 | | | | | |
| | | Dermal Contact/Ingestion | Basement Dirt and Sump Soil | Manganese | 7556 | 2.6 | | | | | |
| | | Dermal Contact/Ingestion | Surface Soil | Manganese | 7533 | 2.6 | | | | | |
| | | Dermal Contact/Ingestion | Groundwater | Manganese | 2.6 mg/L | 1.2 | | | | | |
| SLFS-002 | Lifetime Resident | All | | None | | | | | X | | |
| | Toddler | Dermal Contact/Ingestion | Basement Seep | Lead | 0.16 mg/L | 1.4 | | | | | |
| | | Dermal Contact/Ingestion | Basement Seep | Manganese | 2.3 mg/L | 1.4 | | | | | |
| SLFS-003 | Lifetime Resident | Dermal Contact/Ingestion/Inhalation | Sump Soil | TPH | 7106 | 1.9 | | | X | | X |
| | | Dermal Contact/Ingestion | Basement Dirt | Arsenic | 174 | | 91 | | | | |
| | | Dermal Contact/Ingestion | Surface Soil | Arsenic | 76 | | 40 | | | | |
| | | Dermal Contact/Ingestion | Basement Dirt and Sump Soil | Manganese | 92983 | 2.6 | | | | | |
| | Toddler | Dermal Contact/Ingestion/Inhalation | Sump Soil | TPH | 7106 | 6 | | | | | |
| | | Dermal Contact/Ingestion | Basement Dirt and Sump Soil | Lead | 595 | 1.8 | | | | | |
| | | Dermal Contact/Ingestion | Surrace Soil | Lead | 328 | 1.3 | | | | | |
| | | Dermal Contact/Ingestion | Basement Dirt and Sump Soil | Manganese | 92983 | 10.1 | | | | | |
| SLFS-004 | Any | All | | None | | | | X | | | |
| SLFS-005 | Lifetime Resident | Dermal Contact/Ingestion | Surface Soil | Arsenic | 55 | | 29 | | | | X |
| | Toddler | Dermal Contact/Ingestion | Surface Soil | Lead | 710 | 1.8 | | | | | |
| SLFS-006 | Any | All | | None | | | | X | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SLFS-007 | Lifetime Resident | Dermal Contact/Ingestion | Surface Soil | Arsenic | 88 | | 46 | | | | |
| | | Dermal Contact/Ingestion/Inhalation | Surface Soil | TPH | 6857 | 1.2 | | | | | |
| | | Dermal Contact/Ingestion/Inhalation | Surface Soil | Total PAH | 373 | | 2.5 | | | | X |
| | Toddler | Dermal Contact/Ingestion | Surface Soil | Lead | 925 | 2.2 | | | | | |
| | | Dermal Contact/Ingestion/Inhalation | Surface Soil | TPH | 6857 | 3.7 | | | | | |
| SLFS-008 | Lifetime Resident | Dermal Contact/Ingestion | Basement Dirt | Arsenic | 113 | | 59 | | | | |
| | | Dermal Contact/Ingestion | Surface Soil | Arsenic | 64 | | 34 | | | | |
| | Toddler | Dermal Contact/Ingestion/Inhalation | Basement Dirt | TPH | 3038 | 2.6 | | | X | | X |
| | | Dermal Contact/Ingestion/Inhalation | Surface Soil | TPH | 4356 | 3.7 | | | | | |
| | | Dermal Contact/Ingestion | Basement Dirt | Lead | 357 | 1.1 | | | | | |
| SLFS-009 and 010 | Lifetime Resident | Dermal Contact/Ingestion | Surface Soil | Arsenic | 46 | | 24 | | | | |
| | Toddler | Dermal Contact/Ingestion | Basement Dirt | Lead | 533 | 1.4 | | | X | | X |
| | | Dermal Contact/Ingestion | Surface Soil | Lead | 551 | 1.5 | | | | | |
| SLFS-011 | Lifetime Resident | Dermal Contact/Ingestion | Basement Dirt | Arsenic | 79 | | 42 | | | | |
| | | Dermal Contact/Ingestion | Surface Soil | Arsenic | 81 | | 43 | | | | |
| | Toddler | Dermal Contact/Ingestion | Basement Dirt | Lead | 1662 | 3.7 | | | X | | X |
| | | Dermal Contact/Ingestion | Surface Soil | Lead | 525 | 1.4 | | | | | |
| | | Dermal Contact/Ingestion | Basement Dirt | Manganese | 4930 | 1.3 | | | | | |
| | | Dermal Contact/Ingestion | Surface Soil | Manganese | 4129 | 1.2 | | | | | |
| SLFS-012 | Lifetime Resident | Dermal Contact/Ingestion | Basement Dirt | Arsenic | 49 | | 26 | | X | | |
| | Toddler | Dermal Contact/Ingestion | Basement Dirt | Lead | 321 | 1.3 | | | | | |
| SLFS-013, 014 | Any | All | | None | | | | X | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value If HI>1 | RQ Value If RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SLFS-015 | Lifetime Resident | Dermal Contact/Ingestion/Inhalation | Surface Soil | TPH | 6780 | 1.9 | | | X | | X |
| | | Dermal Contact/Ingestion | Surface Soil | Arsenic | 95 | | 294 | | | | |
| | | Dermal Contact/Ingestion | Sump Water | Arsenic | 0.11 mg/L | | 244 | | | | |
| | Toddler | Dermal Contact/Ingestion/Inhalation | Surface Soil | TPH | 6780 | 5.7 | | | | | |
| | | Dermal Contact/Ingestion | Surface Soil | Lead | 685 | 2.1 | | | | | |
| | | Dermal Contact/Ingestion | Sump Water | Lead | 0.051 mg/L | 0.4 | | | | | |
| SLFS-016 | Lifetime Resident | Dermal Contact/Ingestion | Surface Soil | Arsenic | 67 | | 35 | | | | X |
| | Toddler | Dermal Contact/Ingestion | Surface Soil | Lead | 580 | 1.5 | | | | | |
| SLFS-018 | Lifetime Resident | Dermal Contact/Ingestion | Surface Soil | Arsenic | 63 | | 33 | | | | X |
| | Toddler | Dermal Contact/Ingestion | Surface Soil | Lead | 388 | 1.1 | | | | | |
| SLFS-037, 039, 040 | Any | All | | None | | | | X | | | |
| SLFS-043 | Any | All | | None | | | | X | | | |
| SLFS-051 | Lifetime Resident | Dermal Contact/Ingestion | Surface Soil | Lead | 13797 | 4.4 | | | | | X |
| | Toddler | Dermal Contact/Ingestion | Surface Soil | Lead | 13797 | 28 | | | | | |
| SMFS-001 | Lifetime Resident | Dermal contact/ingestion | Surface soil | TPH | 4300 | 1.2 | | | X | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | TPH | 4300 | 3.7 | | | | | |
| | Toddler | Ingestion | Seeps/sumps | Lead | 0.085 mg/L | 1.5 | | | | | |
| | Toddler | Ingestion | Seeps/sumps | Manganese | 2.6 mg/L | 1.4 | | | | | |
| SUFS-001 | Lifetime Resident | All | | None | | | | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Manganese | 1.45 | 1.6 | | Requires domestic potable water treatment system | | | |
| SWLR-001 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 91.29 | | 48 | | X | | X |
| | | Dermal contact/ingestion | Surface soil | Total PAH | 107.08 | | 1.2 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 2186.81 | 5.3 | | | | | |
| | | Ingestion | Surface soil | Manganese | 8.6 mg/L | 2.5 | | | | | |
| | | Dermal contact/ingestion | Surface soil | TPH | 41649.78 | 35 | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SWLR-002 | Lifetime Resident | All | | None | | | | X | | | |
| | Toddler | All | | None | | | | | | | |
| SWLR-003, 017, 027, 028, 034, 040, 050, 052 | Lifetime Resident | Ingestion | Sump water | Lead | 0.55 mg/L | 1.4 | | | X | | |
| | | Ingestion | Sump water | TPH | 50.96 mg/L | 205 | | | | | |
| | Toddler | Ingestion | Sump water | TPH | 50.96 mg/L | 596 | | | | | |
| | | Ingestion | Sump water | Copper | 0.285 mg/L | 3.9 | | | | | |
| | | Ingestion | Sump water | Lead | 0.55 mg/L | 4.6 | | | | | |
| | | Ingestion | Sump water | Manganese | 3.56 mg/L | 1.6 | | | | | |
| SWLR-004 | Lifetime Resident | Inhalation | Subsurface Soil | TPH | 4427.08 | 1.5 | | | X | X | X |
| | | Dermal contact/ingestion | Surface Soil | Arsenic | 113.9 | | 60 | | | | |
| | Toddler | Inhalation | Subsurface Soil | TPH | 4427.08 | 1.7 | | | | | |
| | | Dermal contact/ingestion | Surface Soil | Lead | 378.97 | 1.7 | | | | | |
| | | Dermal contact/ingestion | Surface Soil | Manganese | 10442.05 | 1.6 | | | | | |
| SWLR-006 | Lifetime Resident | All | | None | | | | X | | | |
| | Toddler | All | | None | | | | | | | |
| SWLR-007 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 90.61 | | 48 | | X | | X |
| | | Dermal contact/ingestion | Sump Soil | Mercury | 15.82 | 1.1 | | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 878.7 | 2.1 | | | | | |
| | | Dermal contact/ingestion | Sump Soil | Mercury | 15.82 | 3.8 | | | | | |
| SWLR-008 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 146.08 | | 77 | | X | | X |
| | Toddler | Dermal contact/ingestion | Exterior surface soil only | TPH | 2073.09 | 1.2 | | | | | |
| | | Dermal contact/ingestion | Exterior surface soil only | Lead | 379.16 | 1.1 | | | | | |
| | | Dermal contact/ingestion | Surface Soil | Manganese | 5159.68 | 1.3 | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SWLR-009, 010, 013, 024 | Lifetime Resident | All | | None | | | | | | | |
| | Toddler | Dermal contact/ingestion | Sump water/soil | Lead | 0.13 mg/L | 1.2 | | | X | | |
| | | Dermal contact/ingestion | Sump water/soil | Manganese | 1.96 mg/L | 1.3 | | | | | |
| SWLR-011 | Lifetime Resident | Dermal contact/ingestion | Exterior surface soil only | Arsenic | 261.08 | | 138 | | | | |
| | | Dermal contact/ingestion | Surface Soil | TPH | 6744.49 | 1.8 | | | X | | X |
| | Toddler | Dermal contact/ingestion | Surface Soil | TPH | 6744.49 | 5.7 | | | | | |
| | | Dermal contact/ingestion | Surface Soil | Lead | 424.98 | 1.2 | | | | | |
| SWLR-012 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 249.15 | | 131 | | | | |
| | | Inhalation | Subsurface Soil | TPH | 7303.63 | 2.6 | | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 639.67 | 1.6 | | | | X | X |
| | | Dermal contact/ingestion | Surface Soil | Manganese | 3850.27 | 1.2 | | | | | |
| | | Inhalation | Subsurface Soil | TPH | 7303.63 | 2.9 | | | | | |
| SWLR-014 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 76.26 | | 40 | | | | |
| | | Dermal contact/ingestion | Surface Soil | Lead | 1256.28 | 1.4 | | | | | |
| | | Ingestion | Sump Water | Copper | 1.25 | 1.7 | | | X | | X |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 1256.28 | 5.6 | | | | | |
| | | Ingestion | Sump Water | Copper | 1.25 | 4.6 | | | | | |
| SWLR-015 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 80.57 | | 42 | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 349.83 | 1 | | | | | X |
| | | Dermal contact/ingestion | Surface Soil | Manganese | 3180.85 | 1.2 | | | | | |
| SWLR-016 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | TPH | 1051.94 | 3.9 | | | | | |
| | | Inhalation | Subsurface Soil | | 5512.45 | | | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | Manganese | 4209.09 | 1.2 | | | | X | X |
| | | Dermal contact/ingestion | Surface Soil | TPH | 1051.94 | 4.3 | | | | | |
| | | Inhalation | Subsurface Soil | | 5512.45 | | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

## TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SWLR-018 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | TPH | 1189.31 | 2.3 | | | | | |
| | | Inhalation | Subsurface Soil | | 4442.26 | | | | | | |
| | | Dermal contact/ingestion | Surface Soil | Total PAH | 146.99 | | 2.1 | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | TPH | 1189.31 | 2.6 | | | | X | X |
| | | Inhalation | Subsurface Soil | | 4442.26 | | | | | | |
| | | Dermal contact/ingestion | Surface Soil | Lead | 546.02 | 1.4 | | | | | |
| SWLR-019 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 77.58 | | 41 | | | | |
| | | Dermal contact/ingestion | Surface Soil | TPH | 920.37 | 5.2 | | | | | |
| | | Inhalation | Subsurface Soil | | 4442.28 | | | | | | X |
| | Toddler | Dermal contact/ingestion | Surface Soil | TPH | 920.37 | 5.8 | | | | | |
| | | Inhalation | Subsurface Soil | | 4442.28 | | | | | | |
| SWLR-020 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 77.9 | | 41 | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | TPH | 1690.46 | 1.5 | | | | | X |
| | | Dermal contact/ingestion | Surface Soil | Lead | 941.75 | 2.2 | | | | | |
| SWLR-022,023 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 86.7 | | 46 | | | | |
| | Toddler | Dermal contact/ingestion | Sump soil | Nickel | 61 | | 6.9 | | X | | X |
| | | Dermal contact/ingestion | Surface soil | Lead | 1134 | 2.6 | | | | | |
| | | Dermal contact/ingestion | Surface soil | Manganese | 6941 | 1.4 | | | | | |
| SWLR-025 | Lifetime Resident | All | | None | | | | X | | | |
| | Toddler | All | | None | | | | | | | |
| SWLR-026 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 47.3 | | 25 | | | | |
| | | Dermal contact/ingestion | Surface Soil | TPH | 18756 | 5.1 | | | | | X |
| | Toddler | Dermal contact/ingestion | Surface Soil | TPH | 18756 | 16 | | | | | |
| | | Dermal contact/ingestion | Surface Soil | Lead | 547 | 1.4 | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value If HI>1 | RQ Value If RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SWLR-029 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 102.6 | | 54 | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 759.7 | 1.9 | | | | | X |
| | | Dermal contact/ingestion | Surface Soil | Antimony | 25.32 | 1.1 | | | | | |
| SWLR-030 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 125.9 | | 66 | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 1353.8 | 3.1 | | | | | X |
| SWLR-031 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 88.2 | | 46 | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 678.5 | 1.7 | | | | | X |
| SWLR-032 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 76 | | 40 | | | | |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 712.8 | 1.8 | | | | | X |
| SWLR-033 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 57.7 | | 30 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 371.2 | 1.1 | | | | | X |
| SWLR-035 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 68 | | 36 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 433 | 1.2 | | | | | X |
| SWLR-036 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 78.9 | | 42 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 559 | 1.5 | | | | | X |
| SWLR-037 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 71.4 | | 38 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 499.4 | 1.3 | | | | | X |
| SWLR-038 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 87.2 | | 46 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 1055 | 2.5 | | | | | X |
| SWLR-039 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 88.9 | | 47 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 615.1 | 1.6 | | | | | X |
| SWLR-043 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 126 | | 66 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 1047 | 2.5 | | | | | X |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

## TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SWLR-044 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 106.3 | | 56 | | | | |
| | | Dermal contact/ingestion | Surface soil | Total PAH | 428 | | 1.8 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | TPH | 3167 | 2.7 | | | X | | X |
| | | Dermal contact/ingestion | Surface soil | Lead | 703 | 1.8 | | | | | |
| | | Dermal contact/ingestion | Surface soil | Manganese | 3940 | 1.2 | | | | | |
| SWLR-045 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 96 | | 51 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | TPH | 1691 | 1.4 | | | | | X |
| | | Dermal contact/ingestion | Surface soil | Lead | 711 | 1.4 | | | | | |
| SWLR-046 | Any | All | | None | | | | X | | | |
| SWLR-048 | Lifetime Resident | Dermal contact/ingestion | Surface Soil | Arsenic | 67 | | 36 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface Soil | Lead | 614 | 2.3 | | | | | |
| SWLR-049 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 53 | | 28 | | | | X |
| | | Dermal contact/ingestion | Surface soil | TPH | 25223 | 6.8 | | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | TPH | 25223 | 21 | | | | | |
| | | Dermal contact/ingestion | Surface soil | Lead | 437 | 1.2 | | | | | |
| SWLR-051 | Any | All | | None | | | | X | | | |
| SWLR-053 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 47.55 | | 25 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 331.33 | 1 | | | | | |
| SWLR-054 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 140.7 | | 74 | | X | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 1275.13 | 2.9 | | | | | |
| SWLR-055 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 114.07 | | 60 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 437.52 | 1.2 | | | | | |
| SWLR-056 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 71.78 | | 38 | | X | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 328.23 | 1.3 | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value If RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SWLR-057 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 115.91 | | 61 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 560 | 1.5 | | | | | |
| SWLR-058 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 90.09 | | 47 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 411.36 | 1.2 | | | | | |
| SWLR-059 | Any | All | | None | | | | X | | | |
| SWLR-060 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 60.55 | | 32 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 661.61 | 1.7 | | | | | |
| SWLR-061 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 64.71 | | 34 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 932.21 | 2.2 | | | X | | |
| | | Dermal Contact | Surface soil | TPH | 1796.14 | 1 | | | | | |
| SWLR-062 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 90.03 | | 47 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 671.97 | 1.7 | | | X | | |
| SWLR-064 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 68.77 | | 36 | | | | X |
| | | Dermal contact/ingestion | Surface soil | TPH | 7172.69 | 2 | | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | TPH | 7172.69 | 6.1 | | | X | | |
| | | Dermal contact/ingestion | Surface soil | Lead | 1190.07 | 2.8 | | | | | |
| SWLR-071 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 59.76 | | 31 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 400.65 | 1.1 | | | | | |
| SWLR-082 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 47.62 | | 25 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 340.29 | 1 | | | X | | |
| SWLR-083 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 116.17 | | 61 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | TPH | 2927.52 | 1.6 | | | | | |
| | | Dermal contact/ingestion | Surface soil | Lead | 547.88 | 1.4 | | | X | | |
| SWLR-085 | Any | All | | None | | | | X | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SWLR-089 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 60.16 | | 32 | | | | X |
| | | Dermal contact/ingestion | Surface soil | PAHs | 138.48 | | 2.6 | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 349.83 | 1 | | | | | |
| | | Dermal contact/ingestion | Surface soil | TPH | 1800.96 | 1 | | | | | |
| SBKG-099 | Lifetime Resident | All | | None | | | | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 471 | 1.3 | | | | | |
| SBKG-144 | Any | All | | None | | | | X | | | |
| SBKG-152 | Lifetime Resident | All | | None | | | | | X | | X |
| | Toddler | Dermal contact/ingestion | Surface soil, sump | Lead | 1456 | 3.0 | | | | | |
| SBKG-213 | Any | All | | None | | | | X | | | |
| SBKG-220 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 71 | | 38 | | X | | X |
| | | Dermal contact/ingestion | Surface soil | Lead | 553 | 2.5 | | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 553 | 7.8 | | | | | |
| | | Dermal contact/ingestion | Basement Sample | Nickel | 58 | 6.9 | | | | | |
| SBKG-231 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 96 | | 50 | | X | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 828 | 2.0 | | | | | |
| SBKG-241 | Any | All | | None | | | | X | | | |
| SBKG-245 | Lifetime Resident | All | | None | | | | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Manganese | 3,719 | 1.2 | | | | | |
| SBKG-246 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 80 | | 42 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 578 | 1.5 | | | | | |
| SBKG-255 | Lifetime Resident | Dermal contact/ingestion | Basement sample, surface soil | Arsenic | 57 | | 30 | | X | | X |
| | Toddler | Dermal contact/ingestion | Basement sample, surface soil | Lead | 596 | 1.5 | | | | | |
| SBKG-260 | Lifetime Resident | Dermal contact/ingestion | Basement sample, surface soil | Arsenic | 124 | | 65 | | X | | X |
| | Toddler | Dermal contact/ingestion | Basement sample, surface soil | Lead | 514 | 1.4 | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

**TABLE 1 NOCO RISK ASSESSMENT RESULT SUMMARY - RESIDENTIAL SITES**

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SBKG-261 | Toddler | Dermal contact/ingestion | Basement sample | Lead | 734 | 1.8 | | | X | | |
| | Toddler | Dermal contact/ingestion/Inhalation | Basement sample | TPH | 1950 | 1.1 | | | | | |
| SBKG-268 | Any | All | | None | | | | X | | | |
| SBKG-269 | Lifetime Resident | Dermal contact/ingestion | Surface soil | carc PAHs | 18 | | 1.6 | | | | X |
| | Toddler | All | | None | | | | | | | |
| SBKG-270 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 46 | | 24 | | | | X |
| | Lifetime Resident | Dermal contact/ingestion/Inhalation | Surface soil | TPH | 9,079 | 1.6 | | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 392 | 1.1 | | | | | |
| | Toddler | Dermal contact/ingestion/Inhalation | Surface soil | TPH | 9,079 | 4.9 | | | | | |
| SBKG-287 | Any | All | | None | | | | X | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

| TABLE 2 NOCO RISK ASSESSMENT RESULT SUMMARY - COMMERCIAL/INDUSTRIAL SITES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SUFS-004 | Any | All | | None | | | | X | | | |
| SWLR-041, 065,066,067,086 | Any | All | | None | | | | X | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

## TABLE 3 NOCO RISK ASSESSMENT RESULT SUMMARY - COMMON & VACANT SITES - CURRENT RECREATIONAL LAND USE

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value If RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SLFS-019 to 028 033 046 | Any | All | | None | | | | X | | | |
| SLFS-034 039 040 042 048 | Any | All | | None | | | | X | | | |
| SLFS-041 | Any | All | | None | | | | X | | | |
| SLFS-044 | Any | All | | None | | | | X | | | |
| SLFS-045 | Any | All | | None | | | | X | | | |
| SLFS-047 | Any | All | | None | | | | X | | | |
| SLFS-049 | Any | All | | None | | | | X | | | |
| SWLR-005 | Any | All | | None | | | | X | | | |
| SWLR-021 and 068 | Any | All | | None | | | | X | | | |
| SWLR-042 | Any | All | | None | | | | X | | | |
| SWLR-047 | Any | All | | None | | | | X | | | |
| SWLR-063 | Any | All | | None | | | | X | | | |
| SWLR-069,070,079,080,081 | Any | All | | None | | | | X | | | |
| SWLR-072,073,074 | Any | All | | None | | | | X | | | |
| SWLR-075 | Any | All | | None | | | | X | | | |
| SWLR-076 | Any | All | | None | | | | X | | | |
| SWLR-077, 078, 084 | Any | All | | None | | | | X | | | |
| SWLR-088 | Any | All | | None | | | | X | | | |
| COMM-001 | Any | All | | None | | | | X | | | |
| COMM-002 | Any | All | | None | | | | X | | | |
| COMM-003 | Any | All | | None | | | | X | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

## TABLE 3 NOCO RISK ASSESSMENT RESULT SUMMARY - COMMON & VACANT SITES - CURRENT RECREATIONAL LAND USE

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| COMM-004 | Any | All | | None | | | | X | | | |
| COMM-005 | Any | All | | None | | | | X | | | |
| COMM-006 | Any | All | | None | | | | X | | | |
| COMM-007 | Any | All | | None | | | | X | | | |
| COMM-008 | Any | All | | None | | | | X | | | |
| COMM-009 | Any | All | | None | | | | X | | | |
| Undeveloped | Any | All | | None | | | | X | | | |
| SBKG-015,049,064 | Any | All | | None | | | | X | | | |
| SBKG-178 | Any | All | | None | | | | X | | | |
| SBKG-229 | Any | All | | None | | | | X | | | |
| SBKG-259 | Any | All | | None | | | | X | | | |
| SBKG-262 | Any | All | | None | | | | X | | | |
| SBKG-263 | Any | All | | None | | | | X | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

## TABLE 4 NOCO RISK ASSESSMENT RESULT SUMMARY - COMMON & VACANT SITES - FUTURE RESIDENTIAL LAND USE

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SLFS-019 to 028 033 046 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 192 | | 101 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 782 | 1.9 | | | | | |
| SLFS-034 039 040 042 048 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 82 | | 43 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 464 | 1.3 | | | | | |
| SLFS-044 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 120 | | 63 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 550 | 1.5 | | | | | |
| | | Dermal contact/ingestion/inhalation | Surface soil | TPH | 2200 | 1.2 | | | | | |
| SLFS-045 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 206 | | 109 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 716 | 1.8 | | | | | |
| SLFS-047 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 62 | | 33 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Mercury | 7.4 | 3.1 | | | | | |
| SLFS-049 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 62 | | 217 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Thallium | 2.3 | 2 | | | | | |
| SWLR-005 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 171.98 | 91 | | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 906.35 | 2.1 | | | | | |
| SWLR-021 and 068 | Lifetime Resident | Indoor air inhalation | Subsurface soil | TPH | 5488 | 2 | | | | | X |
| | | Dermal contact/ingestion | Surface soil | Arsenic | 197 | | 104 | | | | |
| | | Dermal contact/ingestion | Surface soil | Total PAHs | 58 | | 1.1 | | | | |
| | Toddler | Indoor air inhalation | Subsurface soil | TPH | 5488 | 2.2 | | | | | |
| | | Dermal contact/ingestion | Surface soil | Lead | 961 | 2.3 | | | | | |
| SWLR-042 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 98.46 | | 52 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 1271 | 2.6 | | | | | |
| SWLR-047 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 90.3 | | 48 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 1459 | 3.0 | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

## TABLE 4 NOCO RISK ASSESSMENT RESULT SUMMARY - COMMON & VACANT SITES - FUTURE RESIDENTIAL LAND USE

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| SWLR-063 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 110.34 | | 58 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 811.03 | 2 | | | | | |
| SWLR-069,070,079,080,081 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 84.5 | | 45 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 604.59 | 1.6 | | | | | |
| SWLR-072,073,074 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 97.6 | | 51 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 972.7 | 2.3 | | | | | |
| SWLR-075 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 94 | | 50 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 390 | 1.1 | | | | | |
| SWLR-076 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 180 | | 95 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 775.6 | 1.9 | | | | | |
| | | Dermal contact/ingestion | Surface soil | Thallium | 2.14 | 2 | | | | | |
| SWLR-077, 078, 084 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 111 | | 59 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 578.9 | 1.5 | | | | | |
| SWLR-088 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 65 | | 34 | | | | X |
| | | Indoor air inhalation | Subsurface soil | TPH | 7302 | 2.8 | | | | | |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 730 | 1.8 | | | | | |
| | | Indoor air inhalation | Subsurface soil | TPH | 7302 | 3.1 | | | | | |
| COMM-001 | Lifetime Resident | All | | None | | | | X | | | |
| | Toddler | All | | None | | | | | | | |
| COMM-002 | Lifetime Resident | All | | None | | | | X | | | |
| | Toddler | All | | None | | | | | | | |
| COMM-003 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 46 | | 24 | | | | X |
| | Toddler | All | | None | | | | | | | |
| COMM-004 | Lifetime Resident | All | | None | | | | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 412 | 1.2 | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

Hi=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon

## TABLE 4 NOCO RISK ASSESSMENT RESULT SUMMARY - COMMON & VACANT SITES - FUTURE RESIDENTIAL LAND USE

| Site ID | Receptor | Primary Exposure Route | Exposure Medium | Substance | Concentration (mg/kg unless noted) | HI Value if HI>1 | RQ Value if RQ>1 | Risk Management Recommendation | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Further Action | Clean/Repair Basement | Indoor Air Monitoring | Delineate and Exacvate Soil |
| COMM-005 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 98.5 | | 52 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 808.5 | 2 | | | | | |
| COMM-006 | Lifetime Resident | All | | None | | | | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Manganese | 5437 | 1.3 | | | | | |
| COMM-007 | Lifetime Resident | All | | None | | | | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Manganese | 8052 | 1.4 | | | | | |
| COMM-008 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 85.9 | | 45 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 563.7 | 1.5 | | | | | |
| COMM-009 | Lifetime Resident | Dermal contact/ingestion | Surface soil | Arsenic | 137 | | 72 | | | | X |
| | Toddler | Dermal contact/ingestion | Surface soil | Lead | 820 | 2 | | | | | |
| Undeveloped | Lifetime Resident | Indoor air inhalation | Subsurface soil | TPH | 1816 | 5.1 | | | | | X |
| | Toddler | Indoor air inhalation | Subsurface soil | TPH | 1816 | 5.6 | | | | | |

Note: Table only shows HI or RQ results where action is recommended for a particular substance

HI=Hazard Index
RQ=Risk Quotient
TPH=Total Petroleum Hydrocarbon
PAH=Polycyclic Aromatic Hydrocarbon